User Manual

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TYPE : HOL 600/Ex
: -20°C ≤ Tamb ≤ +65°C
: II 2G Ex d IIC T6
: II 2D Ex tD A21 IP68 T80°C
Ser. Nr.: 3009 - 2340 - 5
Zul. Nr.: BVS 08 ATEX E 089 X

Electronic Vibration Monitoring Unit

ESW®-Compact/Ex (hol600/Ex)

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technical modification possible

holthausen elektronik GmbH is certified according to DIN EN ISO 9001.

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Important information

These operation instructions are to be read through completely and carefully heeded before starting the device. Failure to heed or adhere can result in claims on manufacturer's liability becoming null and void for damages ensuing there from.

Manual action of any manner on the device – with the exception of proper procedures and those described in these operation instructions – lead to forfeit of guarantee and exclusion from liability.

The device is solely intended for the usage as described below. It is particularly not intended for the direct or indirect protection of persons.

holthausen elektronik GmbH assumes no liability whatsoever as regards suitability for some specific purpose.

If any question should remain open, please never hesitate to contact us.

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1. Generally basical safety-indications

Don't use this device as the only invigilator, if a malfunctioning of ESW®-Compact/Ex could lead to damages on goods or Persons.

To obtain the desired result be sure, that the device with its technical data fits to the bulk of the object you want to supervise.

The sensor is sensitive to shock. A downfall out lower height to a hard substratum can destroy the sensor.

The assembling place and the execution of the assembling of the sensor determine decisively the quality of the sensor signal. The assembling may only happen through qualified and instructed persons.

The electrical hook up is to be done by instructed persons. A mistake by the connection can entail to faulty functions, outfall or ruination of the sensor and electronics.

The ESW® should not be used on machines with a very energetic high-frequency solid-borne. Through resonance apparitions in the sensor, the device can indicate a much too great or too small value.

Powerful noise sources for instance inverters, in direct closeness of the sensor, electronics or cabling, can result in faulty behaving of the apparatus.

Potential differences and balance currents in the mass guidance can result in faulty behaving too.

The connection cable is resistant against many but not every type of chemicals. Through a damaged cable chemicals could get inside the unit and destroy the electronic. Then the unit would loose their function.
Therefore the conditions from the mounting surrounding must be checked. Then the cover material from the cable have to be proofed if it resists these requirements. You can get an overview from the chemical resistance of the cover material from us.

2. Packing and the transport

Note:

- The sensor is sensitive to shock. A downfall out lower height to an hard substratum can destroy the sensor.
- Avoid to kink or tie a knot in the cable.
- Keep the electronic in a dry place.
- In case of a downfall or heckling or squeezing, could the casing or the operation elements or the board get defects.

With adequate warning-labels and through a qualified packaging and storage, you can protect the sensor and electronics at carriage against influences from outside.

3. Application

The ESW®-Compact/Ex unit will be installed on machines like ventilators, blasts, separators or decanters in order to protect these machines in the application against inadmissible mechanical vibration. The unit monitor continuously the intensity of vibration and warn reliably during exceeding of, inside the unit, adjusted limit values.

4. Measurement principle

The mechanical vibrations are measured with a piezoelectric acceleration transducer. The electronic circuit transforms the acceleration signal into a velocity signal (mm/s), which is evaluated. The measured range is adjusted by DIP-switches inside the unit.

The measured value is compared with two adjustable limiting values G1 and G2, which could be adjusted in range of 10% to 100% with two potentiometers inside the unit. At the analog output the limit values of G1 and G2 can be adjusted when setting of the DIP-switches corresponds to the prove position. If the measured values G2 exceed the critical limit, alarm relay K2 will be activated after e.g. 5 seconds delay time. If limit value G1 is exceeded for more than e.g. 10 seconds, alarm relay K1 will be activated. If the measured value falls below the limit value, the alarm will be cancelled *).

At the “analog output” the measurement value is proportional to the fitted measurement range available, by voting 0 to 20mA or 4 to 20mA.
The unit includes a self-test feature witch allow to test all electronic components inside the unit. Further more it is possible for testing purpose to supply a test signal in to the measurement electronic.

*) Additional supply with alarm memory. After the activation of the alarm relay K1 (or on customer request K2) the unit will remain in the alarm status until an external and manually reset will be activated. This feature is used in such cases, where the vibration control unit is mounted on unreviewable and difficult accessible places. Through this advanced memory function every alarm is registered. Because of variable mounting of one or more parallel connected reset buttons, it is possible to reset the alarm memory from any place or location.
The reset occurs by connection of the external reset contact (violet wire) to ground.

Attention: Pay attention on requirement by entrance in Ex-Zone

5. Requirement for use of units in Ex-Zone 1 and Zone 21

Potential compensation

The housing of the measurement unit must be connected through the attachment with the potential compensation of the monitored machine.
The user is responsible that the potential compensation follows the relevant VDE-regulations and that the installation is made by a qualified employee.

Wire insertion and connection cable

Wire insertion and connection have to resist a minimum temperature of 90℃.

Connection cable

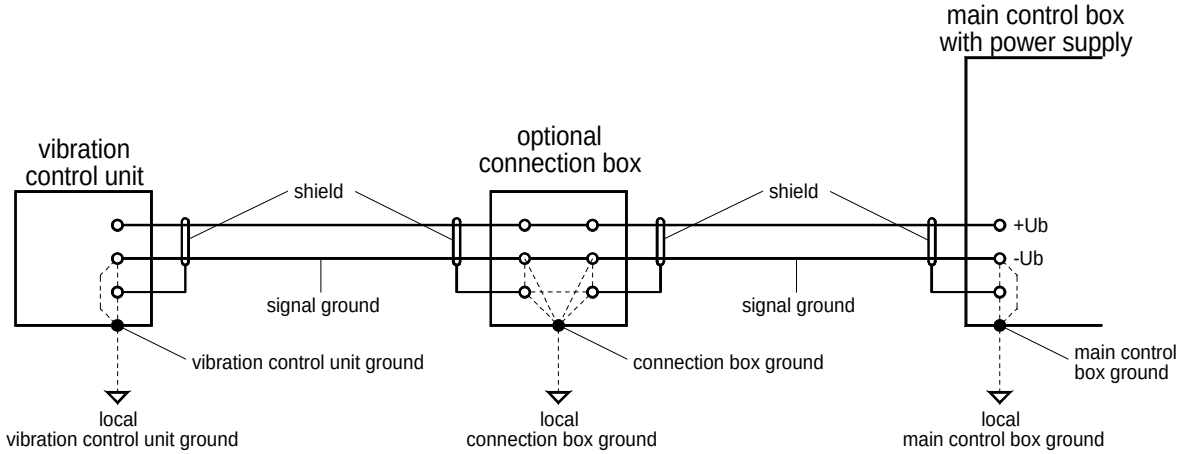
Attention: It is not allowed to transport the unit hanging on the connection cable.

The cable insertion is not protected against mechanical tension. The connection cable must be fastened near the cable insertion in a radius of app. 20cm. The cable should not be bend and damaged.

General

The installer and user is responsible to follow the Ex-rules, relevant in his application.

6. Grounding concept



If an isolated installation is not specially requested, usually through the attachment with screws each case is connected to the local machine ground.

Inside the ESW®-Compact/Ex, dependent on customer request the cable shield and / or the signal ground to the case potential could be connected by the factory.
⇨ Connection to the local ground

The Standard delivery condition for ESW®-Compact/Ex is that, shielding of the connection cable is **not** connected to the case of the unit.
⇨ Connection is **not** implemented to the local ground

Inside the optional plug box, the cable shielding, the box ground and the signal ground could be connected by choice and dependent on local circumstances and requirements.
In big facilities with considerable energy consumption and distances between the machines could such big potential difference be build up, that substantial balancing current on the ground network will occur. Dependent on intensity of such currents is arising of interference's or damaging of the unit the result!
Potential differences could also arise on machines, with small distances not clear crossing of ground potential for example painted color or movable parts like suspension mounting.

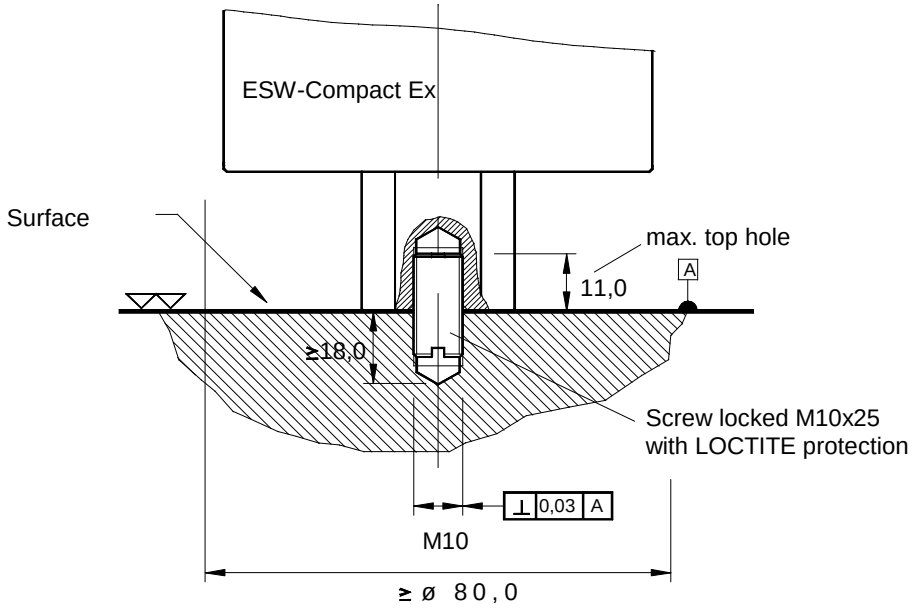
Energetic high frequency interference energy could be added to the measurement signal-wire by inductivity or trough capacity that could change the real existing measurement value! In this way, for example parallel going elements could act as coupling-capacitor and winded up grounding cable could act like a cut off choke.

Memorize: Ground is not equal everywhere!

➔Check the situation ➔Plan the grounding concept ➔Select the facility / realization

7. Mounting of the vibration control unit

- Whole mounting-, connecting- and adjustment-work should be done from qualified personal only!
- Protect the ESW®-Compact/Ex definitely against drop, stroke and other mechanical shock!
- The case of the unit must be connected over the attachment or the ground-on-earth-Terminal with the potential compensation of the monitored machine. The connection must be extremely low resistive as well as for long time stable. Doing this, take urgent notice to the related VDE-regulations.



The ESW®-Compact/Ex will be mounted via one threaded pin AM10*25 per DIN 913 on the machine to be monitored.

Important

1. Measuring axis has to be coinciding with vibration excitation axis (see case drawing page 15).
2. Take note of the label with instruction notes.
3. The surface has to be plain, clean and free of paint and rust.
4. The tap hole has to be perpendicular to the surface and free of metal-cuttings or other foreign material. Further more the tap hole and the screw have to be free of paint, rust, grease or other isolating components.
5. The grub screw has to be locked with liquid thread protection against unintended loosening.
6. The unit has to be fixed, tight on the surface.
7. The advises to „connection cable“ (page 6), as well as „Opening and closing of the vibration control unit “ (page 9) are absolutely to note.

8. Opening and closing of the vibration control unit

The user must switch off the power supply, before opening the measurement unit. To open the unit the user needs a 1,5mm type of wrench “inbus - key“ and a forehead key with two-bore nut, with size of 4mm. The case cover is ensured with a M3 screw. These must be loosened before opening of the case cover, with an “inbus - key”. After adjustment of the unit, please control the position of the DIP-switches.
Before closing the unit the O-Ring must be examine. You have to insert a new O-Ring (62 x 2mm, Viton – original spare part) if the old one is brittle, deformed, damaged or already a few month in use.
Please pay attention that the thread and the interior room is oil- and dirt- free. Cleaning around and inside the unit should be done only with clean and dry cloth. The closing and the sealing of the unit is done after app. seven pitches of cover-nut thread, and ensured via the M3 screw.
“Loosen of the screw on the case bottom and opening of the bottom nut is not permitted.“

Advises for dismantling

Before dismantling the measurement unit, the power supply must be switched off. The connection cable has to be loosened from the supporting surface to avoid damaging of the cable. The vibration control unit should be set free via a 22mm wrench key.

9. Maintenance

The ESW®-Compact/Ex is maintenance free.

The fuse F1 is soldered fixed and should exclusively be replaced by qualified personal. For replacement is a SMD-fuse, type OMF (63V,1A) required.

Tools for case cover opening: 1.5mm type of wrench (Inbus-key)
Adjustable forehead key for two bore nut size 4mm

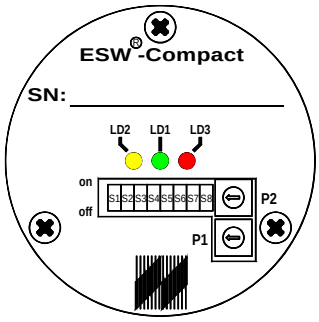
Factory: H. Sartorius Nachf. GmbH & Co
phone +49 (0) 21 02 / 44 00 - 0
fax +49 (0) 21 02 / 44 00 - 24

10. Operating and setting instructions

The display and operating elements will be accessible after unscrewing the cover of the ESW® Compact/Ex.

Display elements

LD2	yellow LED	Self test “active“
LD1	green LED	Operating voltage “on “
LD3	red LED	Limit value G1 exceeded for more than the rise time, K1 has switched

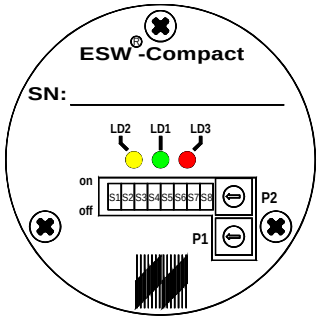


Operating elements

P1	Potentiometer for setting limiting value G1		10 to 100%
P2	Potentiometer for setting limiting value G2		10 to 100%
S1	Range 0 to 10mm/s		ON/OFF
S2	Range 0 to 20mm/s		ON/OFF
S3	Range 0 to 50mm/s		ON/OFF
S4	Analog output	0 to 20mA	ON
		4 to 20mA	OFF
S5	Analog output corresponds to measured value		ON/OFF
S6	Analog output corresponds to limiting value G1		ON/OFF
S7	Analog output corresponds to limiting value G2		ON/OFF
S8	Self test activated		ON/OFF

Setting instructions

After applying the voltage supply the green LED LD1 must light up. The yellow and the red LED should remain dark. The relays are switching in there normal position.



11. Measurement range switching

The unit has three measurement ranges, which can be selected by the switches S1, S2 and S3. For a proper operation of the unit, only one switch has to be in position “ON”, the both other switches should remain in position “OFF“.

Range	Switch Position		
	S1	**S2**	**S3**
10mm/s	**ON**	OFF	OFF
20mm/s	OFF	**ON**	OFF
50mm/s	OFF	OFF	**ON**

12. Analog output

As the output value will be submitted constant current, by voting 0 to 20mA or 4 to 20mA. The selection occurs by switching over of switch S4.
An output current of 20mA meets the 100%-value of the selected measurement range. In the setting of 0 to 20mA is the valid relation 0.2mA per %, in the setting of 4 to 20mA is the valid relation 4mA + (0.16mA per %).

Output range	Switch position
	S4
0 to 20mA	**ON**
4 to 20mA	OFF

13. Analog output settings

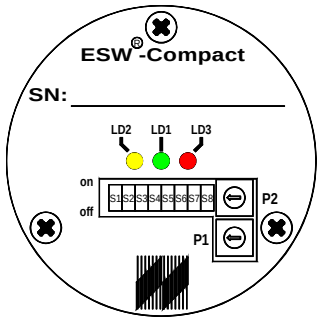
The 0 to 20mA output can be used for displaying of several values on the analog output. With the standard setting the output current corresponds to the measured signal.

For example, an analog current value of 20mA corresponds to a measured vibration velocity that has reached 100% of the measuring range set.

Important: By switching over the Dipswitches, the analog output can be used for setting or reading of the limit values G1 and G2.

The limit value adjustment means a current of 20mA, so that the switch level close to 100% of the adjusted measurement range.

Output Variable	Switch Position		
	S5	**S6**	**S7**
Vibration velocity	**ON**	OFF	OFF
Limiting value G1	OFF	**ON**	OFF
Limiting value G2	OFF	OFF	**ON**



14. Adjustment of the limiting values

If the measuring signal exceeds certain limiting values, the ESW®-Compact/Ex shall react by switching potential-free relay contacts. These limit values can be set inside the unit by potentiometers. The limit values can be set between 10% and 100% of the selected measuring range.

The limit value G1 will be adjusted with potentiometer P1. Exceeded the value of G1 for longer as 10s, then K1 is switched. The limit value G2 will be adjusted with potentiometer P2. If limit of G2 will be longer than 5s exceeded, then K2 is switched. Rest the measured value just from time to time over the limit value, so counts the activation delay time after each overstepping of the limit value once more.

When the analog output of the limiting value setting is switched over, the output current related to 20mA will correspond to the setting of the limiting value related to 100% of the measuring range. If, e.g. G1 has to be set to 15mm/s = 30% in the measuring range of 50mm/s, the output range will be first set to 0 to 20mA via S4 and the output variable to limit value G1 via S5=OFF, S6=ON and S7=OFF. After that, a current output of 6mA (= 30% of 20mA) has to be adjusted by potentiometer P1.
A current of 8.8mA (= 4mA + 30% of 16mA) should be set in the output range 4 to 20mA. The difference between 4 and 20 is 16 ⇨ 30% of 16mA + 4mA = 8.8mA

After setting the limiting values, please pay attention that S5 is set to position “ON“ and S6, S7 to position “OFF“ to activate the function of the analog output as a measuring output.

15. Example to adjust the limit value

Example 1: Analog output 0 to 20mA (mean 0.2mA per %)

Adjust the limit value G1 to 22.5%, and the limit value G2 to 35%:

Measured range 20mm/s	S1	OFF
	S2	ON
	S3	OFF
Analog output 0 to 20mA	S4	ON
Balancing of the limit value G1 to 22.5%	S5	OFF
	S6	ON
	S7	OFF

Set the output current to 4,5mA via P1 (22.5% of 20mA is 4.5mA)

Balancing of the limit value G2 to 35%	S5	OFF
	S6	OFF
	S7	ON

Set the output current to 7mA via P2 (35% of 20mA is 7mA)

Measuring variable “vibration velocity“	S5	ON
	S6	OFF
	S7	OFF
Self test off	S8	OFF

Example 2: Analog output 4 to 20mA (mean 0.16mA per %)

Adjust the limit value G1 to 45%, and the limit value G2 to 60%:

Measured range 20mm/s	S1	OFF
	S2	ON
	S3	OFF
Analog output 4 to 20mA	S4	OFF
Balancing of the limit value G1 to 45%	S5	OFF
	S6	ON
	S7	OFF

Set the output current to 11.2mA via P1 (45% of 16mA is 7.2mA + 4mA)

Balancing of the limit value G2 to 60%	S5	OFF
	S6	OFF
	S7	ON

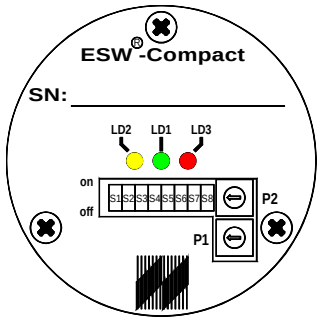
Set the output current to 13.6mA via P2 (60% of 16mA is 9.6mA + 4mA)

Measuring variable “vibration velocity“	S5	ON
	S6	OFF
	S7	OFF
Self test off	S8	OFF

16. Self test

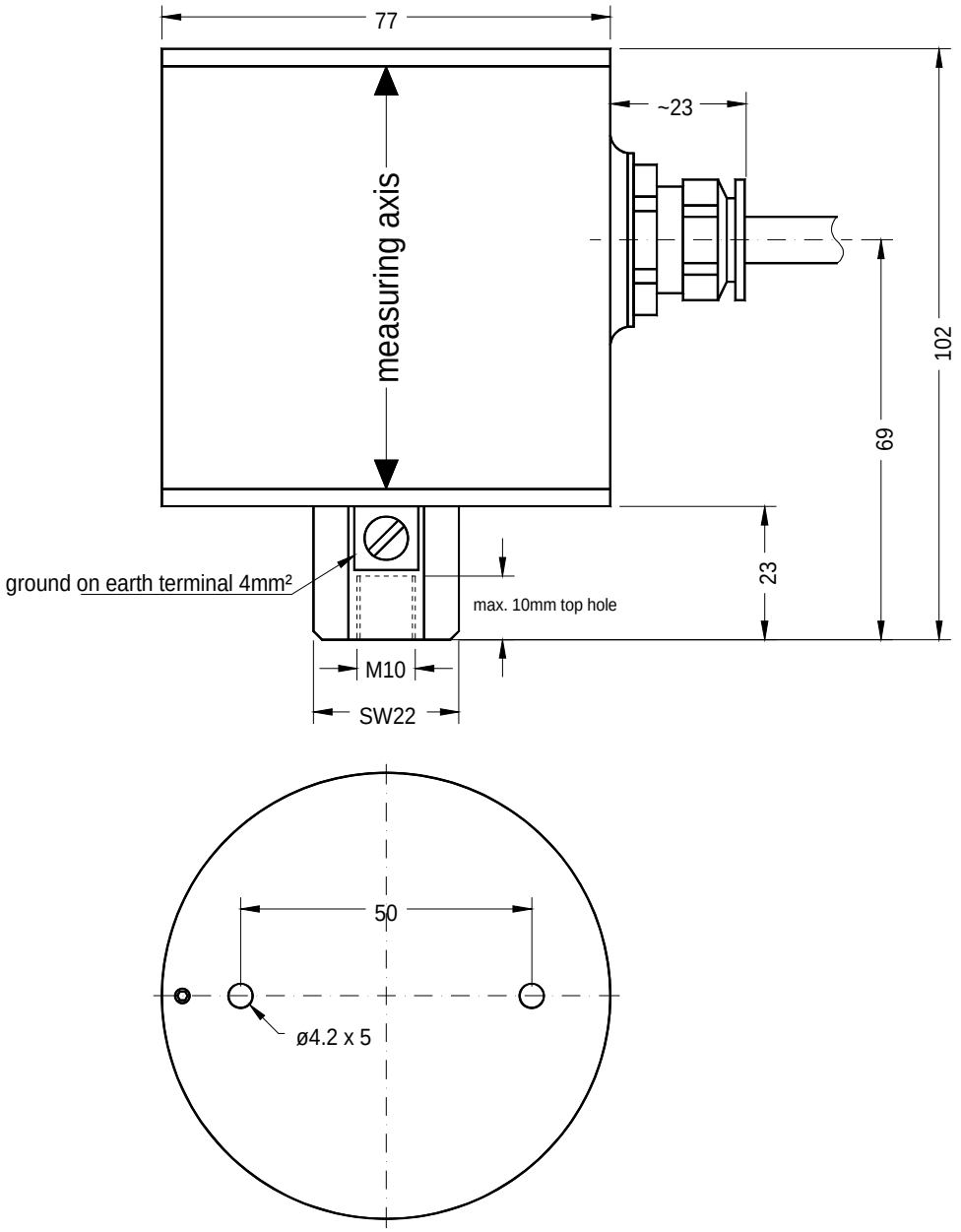
A self-test circuit in the unit is integrated to check the ESW®-Compact/Ex for correct operation. The self-test function could be activated by switches inside the unit and is optically displayed by a yellow LED. After expiration of fixed delay time has K1 and K2 to be switched, and the red LED “Alarm“ must light up. The analog output must give out a current of over 22mA. During the self-test function is the whole electronic incorporated, so that it’s possible to obtain a definite information about the function of the unit.

Function	Switch position
	S8
Self test on	**ON**
Self test off	OFF



Upon execution of the self-test function, it’s absolutely necessary to return the switch S8 to the position OFF in order to ensure the proper function of the ESW®-Compact/Ex. The yellow LED must darken and current has to return to his normal value.
In case the yellow LED is lighting and a higher output current is flowing, without of activation of S8, than the electronic recognize one sensor defect and starts alarm, because the electronic is continuously monitoring the sensor.

17. Housing size (in mm), with optional ground on earth terminal

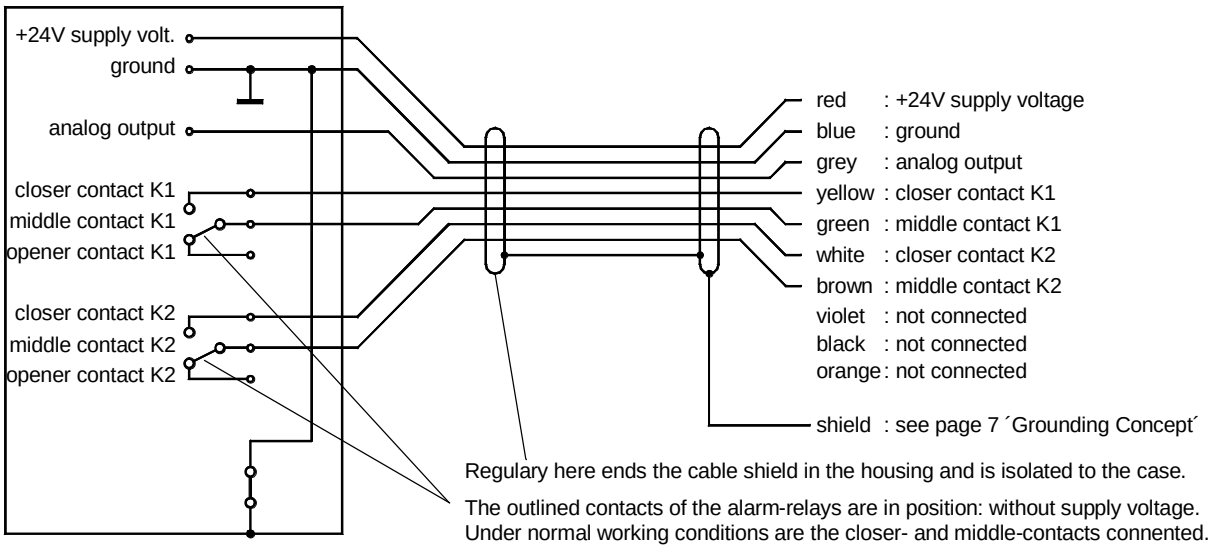


Authorization N.B.:	BVS 08 ATEX E 089 X
Material:	high grade steel V4A
Weight:	2350g
Protection:	IP 68
Cable insertion:	CAPRI Type ADE 1F-4F, IP68, with Neopren-airtight ring

18. Cable connection draft

Version without external reset

ESW®-Compact/Ex



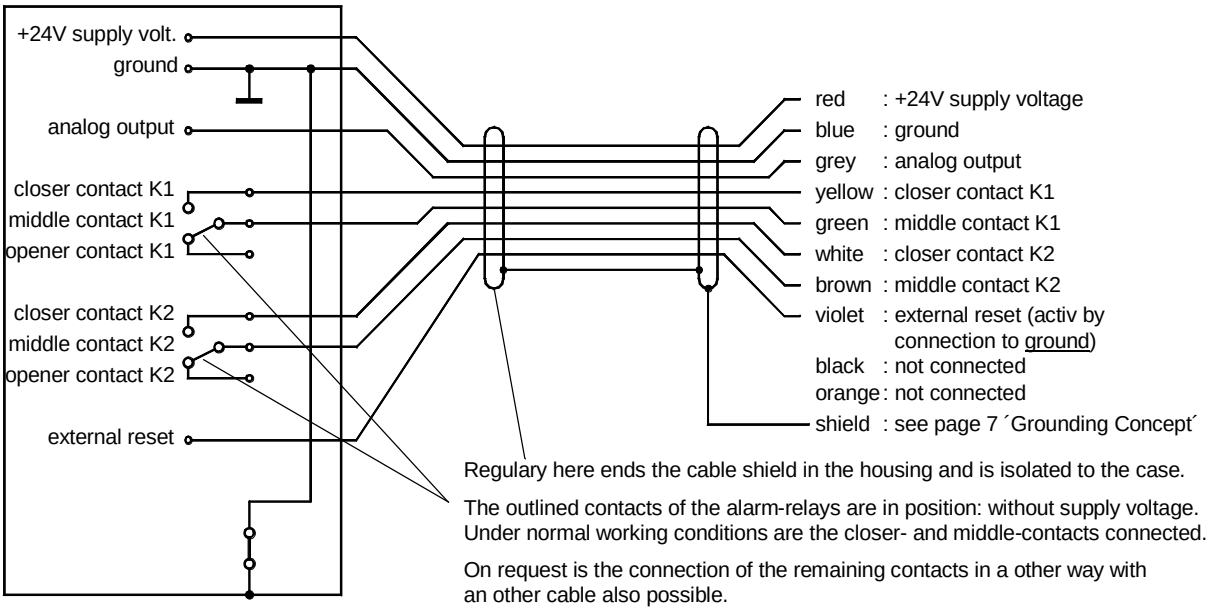
Regulary here ends the cable shield in the housing and is isolated to the case.

The outlined contacts of the alarm-relays are in position: without supply voltage. Under normal working conditions are the closer- and middle-contacts connented.

On request is the connection of the remaining contacts in a other way with an other cable also possible.

Version include external reset

ESW®-Compact/Ex



Regulary here ends the cable shield in the housing and is isolated to the case.

The outlined contacts of the alarm-relays are in position: without supply voltage. Under normal working conditions are the closer- and middle-contacts connected.

On request is the connection of the remaining contacts in a other way with an other cable also possible.

19. Type registration

The unit with the type registration HOL 6xx/Ex is certified by the ATEX guideline 94/9 EC for the use in gas-air-mixture under atmospheric conditions or burnable dust.

Labeling / Registration

Company address	holthausen elektronik GmbH Wevelinghoven 38 D- 41334 Nettetal
Type	HOL 6 . . /Ex
Environment temperature	-20℃ ≤ T_{amb} ≤ +65℃
Gas registration	II 2G Ex d IIC T6
Dust registration	II 2D Ex tD A21 IP68 T80℃
Serialnumber	XX = calendar week/ XX = Year/ XXXX = continuous number
Approvalnumber	BVS 08 ATEX E 089 X CE 0035

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